

2012 Annual Performance Report K12 Cooperative Agreement Notice (CAN)

Administered: Goddard Space Flight Center (GSFC) Office of Education
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Project Description

The K-12 Cooperative Agreement Notice (CAN) is a competitive effort that identifies proposed projects that incorporate innovative approaches for development and delivery of instructional materials and experiences that capture the interest of learners and actively involve them in relevant, NASA science, technology, engineering and mathematics (STEM), STEM-themed and career development at the high school level.

A Congressional appropriation was established in 2008 to improve STEM teaching and learning at the high school level. NASA'S Office of Education, Elementary and Secondary Division established and delivered the competitive grant opportunity. The first awards were granted in 2008. Solicitations were modified in 2009 and 2010 to capture the most recent research in the areas of focus.

The three competitive opportunities between 2008 and 2010 awarded grants to 33 formal and informal education organizations linking to secondary institutions: awards range from \$400,000 to \$1 million totaling \$27.5 million dollars. Awards have been made in the following 17 states, with some states have more than one awarded project: California, Delaware, Florida, Georgia, Idaho, Illinois, Louisiana, Maine, Maryland, Massachusetts, Missouri, New Jersey, New York, North Carolina, Ohio, Texas, Virginia, and Washington, D. C.

NASA Education released the last request for proposals in 2010. In 2011, the focus was on monitoring and providing technical assistance to support existing projects.

The K-12 CAN effort sought innovative approaches to using NASA-themed content in support of secondary level teaching and learning. Each funded proposal leverages NASA's unique contributions to science, technology, engineering and mathematics (STEM) to enhance students' academic experiences and/or to improve educators' abilities to engage and stimulate their students. Funded work is grounded in education research and/or best practices, and incorporates formative, summative and other evaluations, as appropriate. The three competitive opportunities focused on funding projects clearly aligned with NASA's diversity focus and education framework. When the projects are completed, the GSFC Education Office will review the evaluations, data and project summaries to identify impacts, best practices and lessons learned from grantees. This information will be useful to NASA's Office of Education in continuing to develop and deliver STEM programs and services to diverse audiences to promote STEM careers, improve the effectiveness of STEM teachers and positively impact student achievement in STEM.

K-12 CAN Project Goals

- Provide innovative projects in STEM to improve teaching and/or student achievement
- Employ practices that promote STEM careers
- Leverage NASA resources to increase the visibility of the funding opportunity nationwide
- Promote use of new technologies in STEM teaching and learning

Project Benefit to Outcome 2

NASA Office of Education's Outcome 2: Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty.

K-12 CAN contributions:

- Increased use of NASA education resources at the high school level
- Increased number of students exposed to STEM careers
- Improved STEM instruction

2011-2012 Project Accomplishments

The K12 Cooperative Agreement has reached educators in the following 36 states: AK, AZ, CA, CO, CT, DC, DE, FL, GA, IA, ID, IL, IN, KS, MA, MD, ME, MI, MN, MT, NC, ND, NE, NH, NJ, NV, NY, OH, OK, PA, RI, TN, VA, WA, WI, WV.

(1) ***Engaging Native Americans in NASA-Centered Cyberlearning and Career Awareness Activities***. Grant# NNX10AV03A, project end date 08/15/2013. This project builds on NASA Native American initiatives like Scientific Knowledge for Indian Learning and Leadership (SKILL) and Native American Research Laboratories (NARL) and focuses on developing an innovative web-based learning environment entitled ECLIPSE (Environment for Cyber-Learning Integrating Problem Solving Experiences). In a student survey of 195 participants, 31 percent responded that as a result of their NASA experience they would watch television shows that have a science, technology or engineering theme, while 28 percent responded that they would Visit a museum, science center, or planetarium. For additional information on this program contact the Principal Investigator, Ronda Townsend at RTownsend@sps.k12.ok.us

(2) ***Eyes in the Sky II: Facilitating Classroom Research Using NASA Resources And Geospatial Technology***. Grant# NNX09AH82A, project end date 06/21/2013. This project improves science education by offering high school science teachers a long-term, multi-faceted professional development program that provides them with the tools to integrate NASA data, visualizations, and other technologies vital to Earth Science research into their teaching practices. The project reached educators in the following 23 states: AZ, AK, CA, FL, GA, IL, IN, ME, MD, MA, MI, MT, NV, NJ, NY, OH, OK, PA, RI, TX, VA, WA, WI. <http://www.terc.edu/>

(3) ***Inspiring Stem Educators: The NASA Physics And Engineering Collection On Vital/Teacher's Domain***. Grant# NNX10AD28A, project end date 04/30/2013. WNET.ORG proposes to develop, disseminate, and evaluate a collection of online, digital media resources and professional development modules for high school educators and their students comprising topics

in systems engineering, engineering, robotics, and rockets/propulsion. This program reached 24,840 educators in grades 9-12 and 5,074 in grades K-4. There were 585 parent participants as well as 394 school administrators. For additional information on this project contact the Principal Investigator, Jon Rubin at RubinJ@WNET.org

(4) ***Peer To Peer Planetarium (P2P)***. Grant# NNX10AU89A, project end date 9/30/2013. Peer to Peer Planetarium (P2P) is a hands-on, informal learning project for grade 9-12 students enrolled in Chabot's Galaxy Explorers (GE) youth development program. In P2P students learn STEM content through NASA online resources and data, engage in STEM career development instruction and activities, and then study and learn to utilize the NASA data and imagery to create science and astronomy themed planetarium shows for a portable planetarium dome. They present these shows to over 15,000 of their peers at underserved Bay Area schools. In a survey taken among student participants, 59% stated that they preferred learning with NASA resources. For additional information on this project contact the Principal Investigator, Lisa Hoover at Lhoover@chabotspace.org

Operating Under No Cost Extension

(5) ***Chicago Public Schools Capstone Course for Space Science***. Grant# NNX09AH88A, project end date 04/8/2013. In this project, students and teachers are participating in an intensive workshop experience that moves to sustained inquiry via a science fair project and ends with a capstone course that explores issues in astronomy. The grant funds efforts by CPS and five institutional partners to use NASA mission data to increase student knowledge and develop classroom content and activities that center on space science. One hundred percent of educators surveyed responded that their NASA experience provided ideas for encouraging student exploration, discussion and participation. <http://www.cps.edu/Pages/home.aspx>

(6) ***Climate Change High School Teacher Institute***. Grant # NNX10AD25A, project end date 05/31/2013. This project is a twelve day teacher training summer institute targeting high school teachers over two summers including academic school years, 2010-2012. Sixty teachers (30 per summer) are recruited and enrolled in an innovative professional development program grounded in the multiple high school science disciplines (biology, physics, chemistry, Earth, environmental and physical science), that integrates current global change research, relying on extensive integration of NASA data and resource tools, into proposed educational material. 64% of educators surveyed strongly agreed that they could immediately apply what they learned from their NASA experience to their teaching about science, technology, engineering or mathematics (STEM). 73% of those educator participants agreed that the NASA resources will be effective in increasing their students' interest in STEM topics.

(7) ***Columbus City Schools K-12 Support of STEM Education and NASA Missions***. Grant # NNX13AB07A, project end date 9/30/2013. This project received funding support to systemically train in a K-12 feeder pattern to increase student learning and achievement through instruction in NASA-related STEM courses. As of October 2012, this program has reached 155 educator in grades 5-8, 27 educators grades 9-12, and 78 educators grade K-4. It also reached 675 students in grades 5-8 and 260 students in grades 9-12. [http://www.columbus.k12.oh.us/website.nsf/\(ccs_pages\)/Schools_HS_Websites?opendocument](http://www.columbus.k12.oh.us/website.nsf/(ccs_pages)/Schools_HS_Websites?opendocument)

(8) ***Flight Fellowships: Stem In Aerospace Science And Aeronautics***. Grant# NNX10AU89A, project end date 03/30/2013. The North Carolina Science, Mathematics, and Technology Education Center (SMT) is a collaborative project designed to use NASA content to create greater understanding and interest in science and aeronautics and to drive improved STEM outcomes for North Carolina high school students. So far, this project has reached 21 educators. For information on this program contact the Principal Investigator, Sam Houston at shouston@bwfund.org.

(9) ***Idaho STEM Aerospace Scholars*** (Idaho State Board of Education). Grant# NNX10AD32A, project end date 6/30/2013. The purpose of this project is to immerse students in real world, project, and inquiry based aerospace activities that build STEM knowledge and skills, exposing them to NASA and Idaho STEM careers. Sixty-one percent of students surveyed strongly agreed that their NASA experience inspired them to learn more about science, technology, engineering and mathematics. Incredibly, 93% said that participating in the program was a good investment of their time. www.sde.idaho.gov

(10) ***Making Teachers Heroes: Suborbital Science and Astronaut Training***. Grant# NNX10AU91A, project end date 08/31/2013. Teachers in Space, a non-profit project of the Space Frontier Foundation, is conducting an experiential learning program for high-school teachers. This project is providing teachers with first-hand exposure to cutting-edge suborbital science and realistic spaceflight training experiences. This project reached 66 educators in grades 9-12 and 4 educators in grades 5-8. www.tis.spacefrontier.org

(11) ***NASA Earth & Space: Online "Missions" For High School Learners With Accompanying Electronic Professional Development For Educators***. Grant# NNX09AH85A, project end date 5/31/2013. Through online courses, high school students perform as Mission Scientists to explore major concepts in Earth and Space science, making use NASA's treasure trove of mission and research data. For information on this project, contact the Principal Investigator Maureen McMahon at mmcmahon@aacps.org

(12) ***NASA Triad: A Triangulated Program to Promote NASA STEM Education Nationwide***. Grant# NNX10AD33A, project end date 08/31/2013. This project's goal is to produce an online professional development handbook of NASA content for lead teachers to use in conducting workshops for peers and establish a national professional development network of lead teachers prepared to deliver workshops in NASA content for their peers in grades 6-12. This program has reached 24 educators in grades 5-8 and two educators in grades 9-12. www.agiweb.org

(13) ***Young Engineers and Research Scientists (YEARS)*** [City School District of New Rochelle]. Grant# NNX10AU94A, project end date 9/30/2013. The purpose of the project is to address concerns found in numerous reports regarding the country's critical need to improve STEM learning, with a focus on minorities under-represented in the sciences. The project directly impacts student learning and achievement. New Rochelle's six elementary schools, two middle schools and one high school will implement the Young Engineers and Research Scientists (YEARS) project. This program has served 198 students grades nine through twelve, 57 in grades 5-8 and 20 in grades K-4. Eighty percent of those program's activities took place in public schools. <http://www.nred.org/>

- a. Young Engineers and Research Scientists (YEARS), made possible by the NASA Grant, attended the opening day of the Enterprise viewing at the Intrepid Museum. The students were filmed as part of a news segment on Channel 7 (ABC). [http://abclocal.go.com/wabc/html5/video?id=8741812&pid=\\$ion=](http://abclocal.go.com/wabc/html5/video?id=8741812&pid=$ion=)
- b. Young Engineers and Research Scientists (YEARS), as part of the NASA-funded partnership between the City School District of New Rochelle and Columbia University, conducted an event to see the transit of Venus. <http://www.newsday.com/news/nation/venus-passes-across-face-of-sun-1.3763831>

Scheduled for Grant Closeout

(14) ***Astronomy-Scientific Ballooning: An Innovative Learning Instruction and Field Experience Model to Increase the Aspirations of High School Students in STEM Careers*** (Maine Space Grant Consortium). Grant# NNX10AU93A, project end date 12/31/2012. The Maine Space Grant Consortium (MSGC) and its collaborating partners piloted the development, deployment and evaluation of a replicable, scalable, and sustainable career development model that showed demonstrable impact in increasing high school student interest in STEM careers using an innovative Astrobiology-Scientific Ballooning (ASB) model to enhance existing science and mathematics curricula with instruction and hands-on field experience and classroom laboratory-based research that combines the science focus of Astrobiology with the engineering and mathematics focus of Scientific Ballooning using materials that align with Maine's State standards. The team hosted an activity for 300 students which was captured in a video from their local channel 5 on the Astronomy-Scientific Ballooning Program, <http://www.wabi.tv/news/29967/maine-students-hoping-to-launch-their-science-careers-in-farmington>

(15) ***Central Florida Aerospace Academy Curriculum***, Grant # NNX09AH86A, project end date 12/31/2011. The goal of this project was to inspire and engage students in engineering and technology courses, and prepare them for study. For information on this program contact the Principal Investigator Sherrie Nickell at sherrie.nickell@polk-fl.net

(16) ***Challenger Center Missions for High School - Using the power of immersive learning to engage high school students in Earth and space exploration***. Grant# NNX10AD34A, project end date 2/29/2012. This project ensured that new high school missions and classroom activities had strong educational and science content, measurable learning goals, and an evaluation well-grounded in learning outcomes. As of March 2012 this program reported serving 66 students in grades 9-12 and 31 teachers of that same grade level. challenger.org

(17) ***CCSSO Virtual Learning Magnet (MLV) for Space Science and Mathematics*** (Council of Chief State School Officers) [CCSSO]. Grant# NNX09AH80A, project end date 1/25/2012. CCSSO intended to demonstrate that high school levels of achievement in STEM learning and teaching can be uniquely fostered among diverse population through innovative, replicable, and nationally scalable instructional approaches unrestricted by demographics, time or place. For information, please contact Bruce Buterbaugh, Principal Investigator. <http://www.ccsso.org/>

(18) ***DI-NAMIC*** (Delaware Department of Education). Grant# NNX09AT63A, project end date 07/31/2012. Entitled DI-NAMIC, which stands for "Delaware extends Its use of NASA Materials In high school Curricula", the purpose of this grant was to develop three standards-based courses for high school science courses in grades 9 and 12 statewide to include earth science, astrobiology, and environmental science. A student survey revealed that 35% stated that they enjoyed learning when they used NASA materials and 33% stated that they wanted to take more courses studying science, technology, engineering and mathematics after learning with NASA materials.
<http://www.doe.k12.de.us/>

(19) ***Earth to Space Online*** (Harris County Department of Education). Grant# NNX10AV04A, project end date 9/30/2012. Harris County Department of Education (HCDE) proposed to implement Earth to Space Online to develop an online high school Engineering Design and Problem Solving course with free access statewide. This project has reached 54 teachers in grades 9-12. <http://www.ultimateclearlake.com/stories/398727-events-nasa-johnson-space-center-to-host-stem-careers-sessions>

(20) ***Enhancing Earth System Science and STEM Education in High School***. Grant# NNX10AD29A, project end date 12/30/2012. This project provides targeted professional development and a research experience for two cohorts of secondary math and science teachers from the Guilford County Schools Central Region. Project activities encompass innovative strategies to strengthen educator skills in teaching hands-on NASA related STEM content. This program reached 30 educators, grades 9-12 and 8 educators in grades K-4. www.gcsnc.com

(21) Rio Grande Valley Science Association, ***Engaging Teachers and Students in the Rio Grande Valley in Astronomy and Earth and Space Science Association***, Grant# NNX10AD31A, project end date 4/30/2012. The purpose of this project was to prepare teachers in the Rio Grande Valley to become certified to teach Texas new fourth year capstone courses in astronomy and earth and space science. The project provided earth and space science resources, guidance in curriculum development, and training in classroom activities. Activities included summer workshops that concentrated on earth and space sciences, weekend training sessions, on-line training, and Family Science Nights during the school year. An important requirement of the new fourth year courses is a field investigation conducted by students. The grantee offered mini-grants for proposing teachers to support a field investigation. Fifty percent of the educators surveyed said that they will be more effective in teaching STEM concepts introduced in their NASA experience. In addition, 41% stated that the NASA resources suggested would be effective with families.
<https://sites.google.com/site/rgvsatx/>

(22) ***Georgians Experience Astronomy Research In Schools*** (GEARS). Grant# NNX09AH83A, project end date 6/30/2012. The goal of the GEARS project was to transform the way high-school Astronomy was taught in 100% of Georgia's public schools. In a survey given to the 41 participants, 72 percent strongly agreed that they would make changes to their teaching activities because of their NASA experience.
<http://cheller.phy.georgiasouthern.edu/gears/GEARS%20Teacher%20Workshops.html>.

(23) ***Integrating NASA Digital Educational Assets (IDEA)***. Grant# NNX09AT65A, project end date 6/30/2012. This proposal developed a transformative, scalable model at the school district level that was designed to sustain electronic professional development (PD) for science teachers.

This project has served 231 educators in grades 9-12, 324 educators in grades 5-8, and 10 educators in grades K-4. www.nsta.org

(24) ***NASA 21st Century Learning Teams***, (National Commission on Teaching and America's Future) [NCTAF]. Grant# NNX09AT64A, project end date 07/31/2011. The purpose of this project was to prepare students for Science, Technology, Engineering, and Math (STEM) college and workplace success by deploying NASA professionals with deep content knowledge and experience in project-based Learning Studios. STEM Learning Studios engaged one of NASA Goddard's most valuable resources – its personnel – in Learning Teams that became professional development partnerships for teachers who learned how to engage their students in learning activities that drew from NASA education content and the challenges and discoveries emerging from today's NASA missions. For information on this program contact Elizabeth Foster, Principal Investigator <http://nctaf.org/>

(25) ***Students Preparing to Advance into Careers in Engineering (SPACE)*** NASA/North Carolina Mathematics and Science Education Network (NC-MSEN). Grant# NNX10AD22A, project end date 3/31/2012. The purpose of the project was to help improve students' understanding of STEM by: (1) enhancing their attitudes about and their understanding of science and mathematics; (2) delivering high quality NASA-related STEM teacher professional development; (3) forging partnerships that provide effective, intensive STEM intervention using NASA content and resources; (4) implementing activities that support students to remain engaged in studies for the preparation of NASA-related STEM majors and careers. In a survey taken by participating educators, 82% strongly agreed that this NASA experience has inspired them to take NASA content into their classroom. 47% of participating students strongly agreed that when they used NASA materials they enjoyed learning. In contrast, 33% of the students agreed that they are more interested in a career at NASA or a career in science, technology, engineering, or mathematics as a result of these activities. <http://www.unc.edu/depts/msen/SPACE/index.html>

(26) ***New Frontiers: Journeying to Mars with Interactive Technologies***. Grant# NNX10AD27A, project end date 5/31/2012. The objective of this proposal was to create highly interactive high school curriculum materials, centered on future NASA missions to Mars and utilizing motivating technologies such as online social networking sites (eg, Facebook and Wiki). This project reached 179 students in grades 9-12. Twenty-six percent of students surveyed responded that their experience inspired them to learn more about science, technology, engineering, or mathematics.

(27) ***Real-World/In-World NASA Engineering Design Challenge***. Grant# NNX10AD23A, project end date 09/30/2012. This effort offered a unique opportunity for high school students to collaborate with university students and engineering mentors to solve authentic NASA -inspired, design-based engineering problems using highly engaging, 21st-century technology tools and skills. This engineering design challenge began in a real-world setting and then extended seamlessly to a 3D virtual laboratory environment (in-world). In a survey taken by educators served by this program, 58% of the educators strongly agreed that the resources they received would be effective in increasing their students' interest in science, technology, engineering and mathematics topics. For additional information on this program contact the Principal Investigator Shelly Spears at shelley.spears@nianet.org

(28) ***The Global Microscope: Integrating NASA Data Into Learning And Teaching*** (Liberty Science Center Hall of Technology). Grant# NNX10AD24A, project end date 9/30/2012. This project tasks included the development and implementation of teacher training and student components, mounting culminating events, planning and implementing with partner districts to integrate aspects of projects, productions and dissemination of materials. When surveyed, 55% of the educators agreed that the NASA materials used in their experience align well with what they teach. 53% percent said that they would be more effective in teaching science, technology, engineering and mathematics due to their NASA engagement. <http://lsc.org/>

(29) ***Investigating Climate Change and Remote Sensing*** (ICCARS) [Wayne County Intermediate School District]. Grant # NNX10AD30A, project end date 6/30/2012. This project supported middle and high school level (8-11) learning in NASA related STEM content. It engaged students in the investigation and assessment of the indicators and impacts of global climate change (GCC). Amanda Laidlaw, one of the ICCARS teachers, and her students at John Glenn High School in Westland, MI were recently honored by GLOBE (Global Observations to Benefit the Environment). Mrs. Laidlaw and her students received the honor as GLOBE Stars for their work on the GLOBE Student Climate Research Campaign (SCRC). <http://www.globe.gov/news/globe-stars/starsdetail/globe/2012-michigan-climate>

(30) ***Virginia Aerospace Science Technology Scholars*** (Old Dominion University Research Foundation). Grant#NNX09AH87A project end date 08/14/2012. This program's goal was to recruit at least 400 high school juniors, statewide, each fall to participate in VASTS online coursework from December through May. 18 schools have participated in this project. A goal for the project was for (up to) 160 scholars to self-select for the Summer Academy based on course performance. Academy scholars worked with NASA mentors and master educators on designing a human mission to Mars. 88% percent of the students surveyed strongly agreed that NASA does important and exciting work. In comparison, 75% enjoyed learning when using NASA materials. <http://www.vasts.spacegrant.org/>

Project Contributions to PART Measures

The K-12 CAN was developed to offer a competitive opportunity to external organizations to improve STEM instruction and achievement. The K-12 awards are aligned with Outcome 2 of the NASA Education Framework and contribute to accomplishing the PART measures. The available data in the Office of Education Performance (OEPM) system indicate that the awards are supporting the objectives of NASA Education and positively contributing to Outcome 2.

APG 6.1.1.1: ED-12-3 100,000 educators participate in NASA education programs	16,143
APG 6.1.2.2: ED-12-5 600,000 elementary and secondary students participate in NASA instructional and enrichment activities education opportunities	1,321
APG 5.1.2.1: ED-12-1 Achieve 40 percent participation of underserved and underrepresented (in race and/or ethnicity) in NASA higher education projects	31.8 percent

Number of female student participants under represented or underserved in STEM	599
Number male student participants underrepresented or underserved in STEM	484
Number of unique K-12 student participants	1,350
Number of unique long term K-12 educator participants	14,976

Program Management Improvements Made in the Past Year

- 1) Survey responses recorded have increased from 1,443 in FY 2011 to 2,255 in FY 2012.
- 2) Project Activity Report data has tripled from 35 reports received in FY 2011 to 104 reports received in FY 2012.
- 3) Engaged 1,243 parents.
- 4) Monthly All-Hands K-12 Awardee teleconferences are held the first Monday of each month. This forum has yielded a significant increase in reporting data in the Office of Education Performance Measurement (OEPM) database as well as an increase in annual reports for the NASA Shared Services Center (NSSC).
- 5) A database was created by the K-12 CAN Program Manager to assist with grant management, increasing the monitoring and accountability of awardees. This enables the program manager to retrieve an active record of actions or requests, protecting NASAs grant investments.
- 6) Grant closeout consultations have been implemented to assist grant awardees with NSSC closeout procedures and documentation to assure all directives are met toward a successful grant closeout.

Collaborations and Partnerships

The K12 Competitive CAN has engaged over (331) K-12 schools and (103) school districts. Examples of NASA collaborations and partnerships are:

(31) ***NASA LIFTOFF: NASA Learning Inspires Fundamental Transformation By Opening Future Frontiers*** (Alameda County Office of Education). Grant# NNX09AH84A, project end date 05/15/2013. The goal of this project is to transform high school STEM education through creation of classrooms in which teachers and students are actively engaged in NASA Mission research on a continuous basis. The project has collaborated with 27 schools and 12 school districts and partnered with 5 education resource centers, 4 higher education institutions, 2 industry and 2 museum-planetariums. There were 67 educators from grades 5-8. Of that number, 55% strongly agreed that the NASA materials used in their experience align well with what they teach.
<http://www.acoe.org/acoe/>

(32) ***NASA Threads*** (Lincoln Parish School Board). Grant# NNX09AH81A, project end date 04/30/2013. This project is a partnership between K-12 school and Louisiana Tech University to improve high school student achievement in mathematics and science. 37 schools have participated in this project. Educators responded to a survey which asked if the NASA resources used would be effective in increasing their students' interest in science, technology, engineering and mathematics due to their NASA engagement, 69% percent strongly agreed that it would.
<http://www.latech.edu/nasathreads/index.php>

(33) ***SEEDS Scholars: Science, Technology, Engineering, and Mathematics (STEM) Education Enterprise through Discovery in Science*** (National Hispanic University). Grant# NNX10AD26A project end date 05/31/2013. This project provides an in-service teacher training program and a student training program comprised of a NASA content theme-based after-school program and a Saturday Academy. 13 schools have participated in this project. 33% percent of participating students strongly agreed that their NASA experience resulted in them being more interested in science, technology, engineering and mathematics due to their NASA activities. This project reached 67% female students. For information on this program contact Antonio Fuentes, principal investigator for the project at afuentes@nhufoundation.org